25

Glossary

active	A term used to describe an object which has been created by an application.
aperiodic task	A task which must execute only at irregular intervals and has only a soft deadline.
application	In this document, software which makes use of **RTEMS**.
ASR	see Asynchronous Signal Routine.
asynchronous	Not related in order or timing to other occurrences in the system.
Asynchronous Signal Routine	Similar to a hardware interrupt except that it is associated with a task and is run in the context of a task. The directives provided by the signal manager are used to service signals.
awakened	A term used to describe a task that has been unblocked and may be scheduled to the CPU.
big endian	A data representation scheme in which the bytes composing a numeric value are arranged such that the most significant byte is at the lowest address.
bit-mapped	A data encoding scheme in which each bit in a variable is used to represent something different. This makes for compact data representation.
block	A physically contiguous area of memory.

blocked	The task state entered by a task which has been previously started and cannot continue execution until the reason for waiting has been satisfied.
broadcast	To simultaneously send a message to a logical set of destinations.
BSP	see Board Support Package.
Board Support Package	A collection of device initialization and control routines specific to a particular type of board or collection of boards.
buffer	A fixed length block of memory allocated from a partition.
calling convention	The processor and compiler dependent rules which define the mechanism used to invoke subroutines in a high-level language. These rules define the passing of arguments, the call and return mechanism, and the register set which must be preserved.
Central Processing Unit	This term is equivalent to the terms processor and microprocessor.
chain	A data structure which allows for efficient dynamic addition and removal of elements. It differs from an array in that it is not limited to a predefined size.
coalesce	The process of merging adjacent holes into a single larger hole. Sometimes this process is referred to as garbage collection.
Configuration Table	A table which contains information used to tailor **RTEMS** for a particular application.
context	All of the processor registers and operating system data structures associated with a task.
context switch	Alternate term for task switch. Taking control of the processor from one task and transferring it to another task.
control block	A data structure used by the executive to define and control an object.
core	When used in this manual, this term refers to the internal executive utility functions. In the interest of application portability, the core of the executive should not be used directly by applications.
CPU	An acronym for Central Processing Unit.
critical section	A section of code which must be executed indivisibly.

CRT	An acronym for Cathode Ray Tube. Normally used in reference to the man-machine interface.
deadline	A fixed time limit by which a task must have completed a set of actions. Beyond this point, the results are of reduced value and may even be considered useless or harmful.
device	A peripheral used by the application that requires special operation software. See also device driver.
device driver	Control software for special peripheral devices used by the application.
directives	**RTEMS**' provided routines that provide support mechanisms for real-time applications.
dispatch	The act of loading a task's context onto the CPU and transferring control of the CPU to that task.
dormant	The state entered by a task after it is created and before it has been started.
Device Driver Table	A table which contains the entry points for each of the configured device drivers.
dual-ported	A term used to describe memory which can be accessed at two different addresses.
embedded	An application that is delivered as a hidden part of a larger system. For example, the software in a fuel-injection control system is an embedded application found in many late-model automobiles.
envelope	A buffer provided by the MPCI layer to **RTEMS** which is used to pass messages between nodes in a multiprocessor system. It typically contains routing information needed by the MPCI. The contents of an envelope are referred to as a packet.
entry point	The address at which a function or task begins to execute. In Ada, the entry point of a subprogram is the value of the ADDRESS attribute of the subprogram.
events	A method for task communication and synchronization. The directives provided by the event manager are used to service events.
exception	A synonym for interrupt.
executing	The task state entered by a task after it has been given control of the CPU.

executive	In this document, this term is used to referred to **RTEMS**. Commonly, an executive is a small real-time operating system used in embedded systems.
exported	An object known by all nodes in a multiprocessor system. An object created with the **GLOBAL** attribute will be exported.
external address	The address used to access dual-ported memory by all the nodes in a system which do not own the memory.
FIFO	An acronym for First In First Out.
First In First Out	A discipline for manipulating entries in a data structure.
floating point coprocessor	A component used in computer systems to enhance performance in mathematically intensive situations. It is typically viewed as a logical extension of the primary processor.
freed	A resource that has been released by the application to **RTEMS**.
global	An object that has been created with the **GLOBAL** attribute and exported to all nodes in a multiprocessor system.
handler	The equivalent of a manager, except that it is internal to **RTEMS** and forms part of the core. A handler is a collection of routines which provide a related set of functions. For example, there is a handler used by **RTEMS** to manage all objects.
hard real-time system	A real-time system in which a missed deadline causes the worked performed to have no value or to result in a catastrophic effect on the integrity of the system.
heap	A data structure used to dynamically allocate and deallocate variable sized blocks of memory.
heterogeneous	A multiprocessor computer system composed of dissimilar processors.
homogeneous	A multiprocessor computer system composed of a single type of processor.
ID	An **RTEMS** assigned identification tag used to access an active object.
IDLE task	A special low priority task which assumes control of the CPU when no other task is able to execute.

interface	A specification of the methodology used to connect multiple independent subsystems.
internal address	The address used to access dual-ported memory by the node which owns the memory.
interrupt	A hardware facility that causes the CPU to suspend execution, save its status, and transfer control to a specific location.
interrupt level	A mask used to by the CPU to determine which pending interrupts should be serviced. If a pending interrupt is below the current interrupt level, then the CPU does not recognize that interrupt.
Interrupt Service Routine	An ISR is invoked by the CPU to process a pending interrupt.
I/O	An acronym for Input/Output.
ISR	An acronym for Interrupt Service Routine.
kernel	In this document, this term is used as a synonym for executive.
list	A data structure which allows for dynamic addition and removal of entries. It is not statically limited to a particular size.
little endian	A data representation scheme in which the bytes composing a numeric value are arranged such that the least significant byte is at the lowest address.
local	An object which was created with the **LOCAL** attribute and is accessible only on the node it was created and resides upon. In a single processor configuration, all objects are local.
local operation	The manipulation of an object which resides on the same node as the calling task.
logical address	An address used by an application. In a system without memory management, logical addresses will equal physical addresses.
loosely-coupled	A multiprocessor configuration where shared memory is not used for communication.
major number	The index of a device driver in the **Device Driver Table**.
manager	A group of related **RTEMS**' directives which provide access and control over resources.

memory pool	Used interchangeably with heap.
message	A sixteen byte entity used to communicate between tasks. Messages are sent to message queues and stored in message buffers.
message buffer	A block of memory used to store messages.
message queue	An **RTEMS** object used to synchronize and communicate between tasks by transporting messages between sending and receiving tasks.
Message Queue Control Block	A data structure associated with each message queue used by **RTEMS** to manage that message queue.
minor number	A numeric value passed to a device driver, the exact usage of which is driver dependent.
mode	An entry in a task's control block that is used to determine if the task allows preemption, timeslicing, processing of signals, and the interrupt disable level used by the task.
MPCI	An acronym for Multiprocessor Communications Interface Layer.
multiprocessing	The simultaneous execution of two or more processes by a multiple processor computer system.
multiprocessor	A computer with multiple CPUs available for executing applications.
Multiprocessor Communications Interface Layer	A set of user-provided routines which enable the nodes in a multiprocessor system to communicate with one another.
Multiprocessor Configuration Table	The data structure defining the characteristics of the multiprocessor target system with which RTEMS will communicate.
multitasking	The alternation of execution amongst a group of processes on a single CPU. A scheduling algorithm is used to determine which process executes at which time.
mutual exclusion	A term used to describe the act of preventing other tasks from accessing a resource simultaneously.
nested	A term used to describe an ASR that occurs during another ASR or an ISR that occurs during another ISR.
node	A term used to reference a processor running **RTEMS** in a multiprocessor system.
non-existent	The state occupied by an uncreated or deleted task.

numeric coprocessor	A component used in computer systems to enhance performance in mathematically intensive situations. It is typically viewed as a logical extension of the primary processor.
object	In this document, this term is used to refer collectively to tasks, timers, message queues, partitions, regions, semaphores, ports, and rate monotonic periods. All **RTEMS** objects have IDs and user-assigned names.
object-oriented	A term used to describe systems with common mechanisms for utilizing a variety of entities. Object-oriented systems shield the application from implementation details.
operating system	The software which controls all the computer's resources and provides the base upon which application programs can be written.
overhead	The portion of the CPUs processing power consumed by the operating system.
packet	A buffer which contains the messages passed between nodes in a multiprocessor system. A packet is the contents of an envelope.
partition	An **RTEMS** object which is used to allocate and deallocate fixed size blocks of memory from an dynamically specified area of memory.
Partition Control Block	A data structure associated with each partition used by **RTEMS** to manage that partition.
pending	A term used to describe a task blocked waiting for an event, message, semaphore, or signal.
periodic task	A task which must execute at regular intervals and comply with a hard deadline.
physical address	The actual hardware address of a resource.
poll	A mechanism used to determine if an event has occurred by periodically checking for a particular status. Typical events include arrival of data, completion of an action, and errors.
pool	A collection from which resources are allocated.
portability	A term used to describe the ease with which software can be rehosted on another computer.
posting	The act of sending an event, message, semaphore, or signal to a task.

preempt	The act of forcing a task to relinquish the processor and dispatching to another task.
priority	A mechanism used to represent the relative importance of an element in a set of items. **RTEMS** uses priority to determine which task should execute.
priority inheritance	An algorithm that calls for the lower priority task holding a resource to have its priority increased to that of the highest priority task blocked waiting for that resource. This avoids the problem of priority inversion.
priority inversion	A form of indefinite postponement which occurs when a high priority tasks requests access to shared resource currently allocated to low priority task. The high priority task must block until the low priority task releases the resource.
processor utilization	The percentage of processor time used by a task or a set of tasks.
proxy	An **RTEMS** control structure used to represent, on a remote node, a task which must block as part of a remote operation.
Proxy Control Block	A data structure associated with each proxy used by **RTEMS** to manage that proxy.
PTCB	An acronym for Partition Control Block.
PXCB	An acronym for Proxy Control Block.
quantum	The application defined unit of time in which the processor is allocated.
queue	Alternate term for message queue.
QCB	An acronym for Message Queue Control Block.
ready	A task occupies this state when it is available to be given control of the CPU.
real-time	A term used to describe systems which are characterized by requiring deterministic response times to external stimuli. The external stimuli require that the response occur at a precise time or the response is incorrect.
reentrant	A term used to describe routines which do not modify themselves or global variables.
region	An **RTEMS** object which is used to allocate and deallocate variable size blocks of memory from a dynamically specified area of memory.

Region Control Block	A data structure associated with each region used by **RTEMS** to manage that region.
registers	Registers are locations physically located within a component, typically used for device control or general purpose storage.
remote	Any object that does not reside on the local node.
remote operation	The manipulation of an object which does not reside on the same node as the calling task.
return code	Also known as error code or return value.
resource	A hardware or software entity to which access must be controlled.
resume	Removing a task from the suspend state. If the task's state is ready following a call to the **task_resume** directive, then the task is available for scheduling.
return code	A value returned by **RTEMS** directives to indicate the completion status of the directive.
RNCB	An acronym for Region Control Block.
round-robin	A task scheduling discipline in which tasks of equal priority are executed in the order in which they are made ready.
RS-232	A standard for serial communications.
running	The state of a rate monotonic timer while it is being used to delineate a period. The timer exits this state by either expiring or being canceled.
schedule	The process of choosing which task should next enter the executing state.
schedulable	A set of tasks which can be guaranteed to meet their deadlines based upon a specific scheduling algorithm.
segments	Variable sized memory blocks allocated from a region.
semaphore	An **RTEMS** object which is used to synchronize tasks and provide mutually exclusive access to resources.
Semaphore Control Block	A data structure associated with each semaphore used by **RTEMS** to manage that semaphore.
shared memory	Memory which is accessible by multiple nodes in a multiprocessor system.

signal	An **RTEMS** provided mechanism to communicate asynchronously with a task. Upon reception of a signal, the ASR of the receiving task will be invoked.
signal set	A thirty-two bit entity which is used to represent a task's collection of pending signals and the signals sent to a task.
SMCB	An acronym for Semaphore Control Block.
soft real-time system	A real-time system in which a missed deadline does not compromise the integrity of the system.
sporadic task	A task which executes at irregular intervals and must comply with a hard deadline. A minimum period of time between successive iterations of the task can be guaranteed.
stack	A data structure that is managed using a Last In First Out (LIFO) discipline. Each task has a stack associated with it which is used to store return information and local variables.
status code	Also known as error code or return value.
suspend	A term used to describe a task that is not competing for the CPU because it has had a **task_suspend** directive.
synchronous	Related in order or timing to other occurrences in the system.
system call	In this document, this is used as an alternate term for directive.
target	The system on which the application will ultimately execute.
task	A logically complete thread of execution. The CPU is allocated among the ready tasks.
Task Control Block	A data structure associated with each task used by **RTEMS** to manage that task.
task switch	Alternate terminology for context switch. Taking control of the processor from one task and given to another.
TCB	An acronym for Task Control Block.
tick	The basic unit of time used by **RTEMS**. It is a user-configurable number of microseconds. The current tick expires when the **clock_tick** directive is invoked.
tightly-coupled	A multiprocessor configuration system which communicates via shared memory.

timeout	An argument provided to a number of directives which determines the maximum length of time an application task is willing to wait to acquire the resource if it is not immediately available.
timer	An **RTEMS** object used to invoke subprograms at a later time.
Timer Control Block	A data structure associated with each timer used by **RTEMS** to manage that timer.
timeslicing	A task scheduling discipline in which tasks of equal priority are executed for a specific period of time before being preempted by another task.
timeslice	The application defined unit of time in which the processor is allocated.
TMCB	An acronym for Timer Control Block.
transient overload	A temporary rise in system activity which may cause deadlines to be missed. Rate Monotonic Scheduling can be used to determine if all deadlines will be met under transient overload.
user extensions	Software routines provided by the application to enhance the functionality of **RTEMS**.
User Extension Table	A table which contains the entry points for each user extensions.
User Initialization Tasks Table	A table which contains the information needed to create and start each of the user initialization tasks.
user-provided	Alternate term for user-supplied. This term is used to designate any software routines which must be written by the application designer.
user-supplied	Alternate term for user-provided. This term is used to designate any software routines which must be written by the application designer.
vector	Memory pointers used by the processor to fetch the address of routines which will handle various exceptions and interrupts.
wait queue	The list of tasks blocked pending the release of a particular resource. Message queues, regions, and semaphores have a wait queue associated with them.
yield	When a task voluntarily releases control of the processor.